Thomas), although in almost all the cases of this malady in which the cells were studied they were found in a state of chromatolysis. Nissl,[1] in speaking of the changes which occur in a motor cell after its nerve-fibre is cut, says that if this reaction were the expression of loss of function of the motor nerves we could hardly understand why the cells become normal again, although the loss of function persists.

It seems probable from these statements that cellular alteration, as seen by Nissl's method, is exceedingly common after injury of the axis-cylinder, but does not invariably occur, or if it occurs may be only temporary and not of vital importance.

We have as yet no knowledge as to the condition of the neurofibrils within the nerve-cells when the axis-cylinders are cut. The extraordinary statements made by Apáthy and Bethe lead us to believe that injury of an axis-cylinder is even more likely to effect a change in the cell of origin than we had believed. In future attention will be directed toward the pathological condition of the neurofibrils. The investigations of Becker, Apáthy, Bethe, and Held indicate that important discoveries in the normal and pathological histology of the nervous system are in store for us. The statements of Apáthy and Bethe in regard to the anatomy of the central nervous system have induced Nissl[2] to say that the neuron theory can no longer exist. v. Lenhossék,[3] however, warns us that sufficient proof has not been furnished in regard to the statement that the neurofibrils are the only conducting elements for nervous impulses, and still more recently he shows that even Bethe's[4] findings do not oblige us to deny the individuality of the neuron.

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[1] Loc. cit.

[2] Loc. cit.

[3] v. Lenhossék. Abstract of Bethe's paper in Neurologisches Centralblatt, 1898, No. 20, p. 944.

[4] v. Lenhossék's Neurologisches Centralblatt, 1899, No. 6, p. 242.

When we looked around us after these discoveries, and were able to attribute so many of the essential phenomena of nature to life, and we made this life recognizable to the eye, it was thought that the final step had been reached and that the study of chemistry had been dethroned for that of microscopy. But what the microscopist was unable to do because his field of vision was limited to morphology the chemist has succeeded in, and he has shown us by what processes the cell accomplishes these vital phenomena, or, in other words, has indicated to us its physiology.

It has been demonstrated by Croft-Hill and others that the essential physiological functions of the cell—those which characterize it as a living being—are carried out by chemical substances which scarcely belong to it, or at least can be extracted from it, and still remain capable of acting outside the cell which produced them.

The processes of nutrition comprising the decomposition of complex molecules into simpler ones, or its opposite, the synthesis of simpler substances; the coagulation and liquefaction of substances so that they can be more easily acted upon; the respiration of the cell comprising oxidation and reduction—all are the results of diastases or enzymes or ferments within and manufactured by the cell, and which produce the same effects when excreted or otherwise separated from it.

For years chemists have been studying the diastases excreted by the cells of the digestive tract which are so essential to general nutrition; rennet, with its action of coagulation on proteids; pepsin, with its action of decomposition in an acid; trypsin in an alkaline medium; the emulsifying ferments in the bile and pancreatic juice; they even comprehended that the cause of coagulation of the blood was a ferment; but that the cells themselves carried on their infinitesimally small processes of nutrition by the same or analogous diastases of coagulation and liquefaction, of decomposition, of oxidation and reduction, remained for one day to demonstrate.

It is this knowledge that draws from Duclaux the delightful simile between the cell and the court of an Indian Rajah, with its unchanging ceremonial carried on by domestics whose number equals the special work to be done, because the duties of each are determined, and encroach upon one another only in emergencies.

As yet we can only guess at the number of different diastases. It is probable that, for instance, almost every microbic species possesses one or several peculiar to it, in order to enable it to draw its nourishment from certain predilective substances or defend itself against substances injurious to it by coagulating them so that they cannot penetrate the cell, by neutralizing them or by dissolving them.

Metschnikoff's work has proven that it is the diastases produced and excreted by the phagocyte, stimulated by the diastases from the infectious microbe, that act as the means of defense to the organism, destroying by dissolution the microbes, or neutralizing their toxin, and the apparent struggle between two living beings—the cell and the microbe—is in reality a question of antagonism between chemical substances.

Like their generators—the cells—these diastases are capable of producing effects out of all proportion to their size, and though they have not the power of reproduction, they possess its equivalent immortality, inasmuch as in favorable media they continue to cause indefinitely their effect without lessening or destroying themselves.

It is to Roux and Yersin that we owe the discovery that the active principle of diphtheria antitoxin is a diastase, and following this came the knowledge that the different microbic toxins are to be classified under the same head. Being diastases they adhere to precipitates in liquids containing them; and in the organism, or when carried in the circulation, attach themselves to cells of tissues, and can even manifest preferences toward particular kinds of cells.

Wasserman and Takaki demonstrated that the brain of a guinea-pig pounded into an emulsion with sterile water and injected in a mixture with tetanus toxin had no effect on an animal, even though very susceptible to tetanus; and Metschnikoff concluded this experiment by proving that this was not due to the presence of an antitoxin, but that the toxin was only fixed and immobilized by its adherence to the cerebral cells, in the same way as in the experiments of Roux and Yersin it had adhered to the precipitate of chalk.

It is on this epoch-making work that Duclaux formulates his definition of a microbic toxin as a diastase, which, in travelling through the organism, attacks certain cells more or less necessary to it, and shows its presence and persistence by more or less profound disturbances. If this is true, and the proof is too well substantiated to doubt it, a new era in the study of toxins and antitoxins lies before us. From the fact that the destruction of a limited number of essential cells in an organism can lead to disease or death of the organism, a new disproportion between the effect and the cause (already great in the action of diastases) is added. Duclaux asks, "What is the weight of the cells of the central nervous system or of the pneumogastric that, destroyed, will lead to cessation of the movements of respiration and, consequently, death? Probably only a few milligrammes, and if these cells were killed by the action of a diastase, this need not exceed one-thousandth of a milligramme, which then would become a fatal poison for a man of sixty kilos—that is, of 60,000 million times the weight of the substance intoxicating (about one-millionth of a grain for a man of 170 pounds)."

With such wonderful facts before us the prominence of even the ultimate cell and the microbe must give way to the importance of the different diastases, and it is consequently not to be wondered at that to this study of diastases, toxins, and venins Duclaux devotes the whole of the second volume in his *Traité de Microbiologie*. The first volume of this magnificent work appeared a little over a year ago, and is principally a text-book of bacteriology, treating of bacteriological morphology, technique, and the subjects coming naturally into such a text-book.

The third volume, which is expected at the end of the year, will treat of immunity. As was to be anticipated, this treatise on diastases, their properties, description, and classification, is carried out to the limits of our present-day knowledge. It is a recapitulation of the discoveries and work done by the scientists throughout the world, arranged into a text-book by one of the best known among them.

Duclaux's style is clear, if not always concise, and, like Herbert Spencer, his apt illustrations and way of putting an uncommon thought or a new theory or an explanation that might be obscure from several aspects make him impossible to be misunderstood. If we are to judge the work from the two volumes already published, it will be an acquisition to medicine of which the whole world may be proud. J. W.

CYCLOPÆDIA OF THE DISEASES OF CHILDREN. Supplemental volume. Edited by M. A. EDWARDS, M.D. 8vo. Pp. 1332. Philadelphia: J. B. Lippincott & Co.

UP to the time of the issuing of the *Cyclopædia of the Diseases of Children* there had not appeared—nor, indeed, has there since appeared—any work devoted to pediatrics published in English so great in its conception and splendid in its execution. In fact, the publication stands alone—a memorial to the ability of the lamented Keating. It is a question whether it is not better to let such classical works be. Attempts to supplement them in any way by later writings are generally ill-advised. They mar instead of make.

There seems to have been a great lack of uniformity followed by the contributors in the construction of the articles. In some cases the effort has been made merely to supplement the original article, adding what is new and changing what is old and incorrect. This is commendable. In too many instances the authors have made their writings seemingly too complete, giving definitions and details of causes, symptoms, and pathology. This is unnecessary and a burden to the reader, since these are, for the most part, to be found in the original articles. In other instances the contributors have entirely reconstructed the original article, which is a good plan where they were the original authors. In still other cases the reader is left in some doubt whether the article is a supplement or a substitute, and he is consequently uncertain how much of the original he is still to accept as true. To some articles has been added an extensive bibliography of the past ten years, while in others only a few names are mentioned in the text, and one wonders whether or not there are others. Finally, we cannot tell whether we are to infer, because a disease is not mentioned—as, for instance, the whole class of diseases of the mouth—that there has been nothing new written on the subject in the last ten years.

Facts like these illustrate the difficulties which attend the construction of supplemental volumes, and confirm us in the feeling that the original works are seldom improved and often injured by them. Yet we fully appreciate the desire of the editor and publisher to bring the *Cyclopædia* up to date, and we admire the degree of success attained; for, after all, the volume is an excllent one—as good in most respects as can be expected with these difficulties to be met.

There are ninety-five separate sections, contributed by almost as many different writers. A number have been made by the original contributors; many have not.

We note at the outset a valuable article by Ballantyne upon Congenital Diseases and Diseases of the New-born. The paper on the Therapeutics of Children, by Hare, badly needs some detailed reference to the tolerance or intolerance of various drugs in early life. There was nothing regarding this important and practical matter in the original article by Bartholow, and a great opportunity has been missed in this supplement. The contribution on Mortality in Early Life appears to be a short sketch of the mortality in New York City—hardly sufficient for a general work of this kind.

Rotch's paper on Feeding in Infancy is an able supplement to his earlier contribution—thorough, careful, and elaborate, as his writings always are.

The section on Typhoid Fever hardly represents our present knowledge of the frequency of this disease in infancy and childhood. Experience has abundantly proven that it is not so rare in the first two years of life as the author states. A brief review of the literature of the last ten years shows this quite well.

J. Lewis Smith's paper on Diphtheria was one of the best in the *Cyclopædia*, and Lennox Browne's supplement is satisfactory in every respect save one—viz., the writer's attack upon the serum treatment. Argument of any sort is out of place in a cyclopædia of this nature, in which the writer is expected to give less of his own opinion and more of the accepted views of leading authorities in general, with a careful weighing and balancing of these. But in this contribution many pages are wasted in argument, often somewhat sophistical and never convincing, against the widely accepted opinions of the value of antitoxin. The vast collections of statistics in favor of it have been almost wholly ignored, and the statements are based upon the results in a single hospital. Whatever the value of the treatment may be, this method of discussing it is far from judicial.

The section on Rheumatism, by Cheadle, is an excellent, moderate article which fairly presents the various theories of the etiology of the disease, while distinctly supporting the view of its infectious nature.

In the section on Tuberculosis, by Blumer, we should like to have seen some more extended discussion of the relative frequency of the entrance of the bacilli through the lungs and the digestive tract respectively. The matter is referred to later in an excellent contribution by Jacobi on Pulmonary Tuberculosis.

The articles on Scurvy and on Cretinism are contributed respectively by masters of the subjects—Barlow and Osler. The italicised statement that there is in scurvy no characteristic affection of the gums unless teeth have appeared is true only with exceptions, as the statistics of the American Pediatric Society's collective investigations have clearly shown.

We regret to see introduced into this volume the use of the rather antiquated term "mucus disease" as the heading of a section. The conception of this condition as an entity has been abandoned by practically all the best modern writers. Confusion, too, is produced by the application of the term to an entirely different condition in the main body of the *Cyclopædia*.

Ashhurst's advice to operate in intussusception after four to six days of medical treatment is too conservatively dangerous to represent the most widely accepted views.

The article upon Appendicitis is excellent, but something more definite about the disease as seen in children would have been of advantage; and it would be discouraging to see the diagnosis written of as so easy did we not know that many surgeons of very wide experience do not find it so.

The section on Diseases of the Liver, by Musser, is one of the most praiseworthy of the volume. It is an excellent appendix to his original article.

W. A. Edwards contributes an excellent section on Diseases of the Uterus, Vagina, and Vulva, and H. A. Kelly one equally good on Diseases of the Ovaries and Fallopian Tubes.

The article on Fractures and Dislocations is stated to be a résumé of the cases reported in the last ten years. The author begins by referring to only two cases of fragilitas ossium, whereas we know that probably a dozen have been reported during this period. It is possible that the literature of the balance of the article is more complete.

Finally, in the department of Nervous Diseases, we notice excellent papers by Mills, Sachs, Collins, Nancrede, Putnam, and others.

The volume is freely illustrated, and is terminated by a most satisfactory index.

J. P. C. G.

AN EPITOME OF THE HISTORY OF MEDICINE. By ROSWELL PARK, A.M. M.D., Professor of Surgery in the Medical Department of the University of Buffalo, etc. Based upon a course of lectures delivered in the University of Buffalo. Second edition, illustrated with portraits and other engravings. Pp. xiv., 370. Philadelphia: The F. A. Davis Co., 1899.

THE author begins his preface with the statement that the history of medicine has been sadly neglected in our schools—a statement as melancholy as it is true. Individuals are continually met with who have a reverence for and are versed in the achievements of those who have gone before, but there are few instances of any systematic endeavor to impart any knowledge of the wonderful history of his art to the student on the benches. In institutions for the teaching of theology or law or military science there are always provisions for the instruction of the student in the history of his profession, but in few medical schools is this the case.

The sources from which a knowledge of the history of medicine could be derived are many, but possibly the most profitable is to be found in a perusal of the works of the great leaders of thought in the profession of various periods.

Dr. John Brown, the author of *Rab and his Friends*, advocated strongly that medical students should be required to study the works of the ancient physicians and to pass examinations on them. Certainly, none can doubt that not only pleasure (some might prefer to say amusement) but also profit is to be derived from the works of Paré; and the memoirs of Baron Larrey, though they are, it is true, of much more recent date, still possess real professional value as well as the most thrilling interest.

It is to be most devoutly wished that at some future time a chair will be established in every institution for the teaching of medicine whose occupant shall direct the attention of the student to those who have been epoch-makers in the upward progress of the profession, and that instead of the student having the impression that the previous history of medicine consists in a knowledge that prescriptions of the past were solely made up of snakes and frogs and other nauseating materials, he will be able to recognize for himself that many of the physicians of yore were men of much learning, and often imbued with the most scientific impulses and philosophical aims.

It is customary to lament the fact that medical nomenclature contains so many appellations which, consisting as they do of proper names, convey no meaning as to the part or organ or disease which they designate. These names represent all periods of history and most of the nations under the sun. In the nomenclature of no other science is this recurrence of proper names so frequent. To the average medical student or doctor they are an unpronounceable, readily confused, and easily forgotten jumble. Yet most of these names should conjure up the master of medicine whose fame it aids to perpetuate, and should recall to the studious the memory of the man who was the discoverer of the organ or the pioneer in the study of disease.

As things go now these weighty names represent naught. What ideas are raised in a medical student's mind when the lecturer mentions the parts named for Fallopius, Glisson, Eustachius, or Sylvius; or if he refers to the pathological conditions which bear the name of Brodie, Bell, or Colles.

He is merely struck with the burden which he bears of being obliged to couple an individual's name to something which it has, for him, no visible connection. If the study of the history of medicine were made a part of his curriculum the student would find these names, so constantly recurring, a source of aid in his studies, as they would serve to recall some interesting event in medical history related to the object of his labors, and thus render the task of connecting the object in his memory with something else more readily accomplished.

The only useful purpose that can be served by such a system of nomenclature is that of subserving historical ends, and when the latter are utterly neglected such a system is worse than useless.

Dr. Park gives a list of the principal authorities on the history of medicine of whose labors he has availed himself in the preparation of his epitome. He includes the work of Baas, which has been made known to the profession in this country by the publication of a translation of it into English. He also refers to the classical work of Bouchat.

An adequate history of medical science in the United States has yet to appear. Since James Thatcher published his sketches of *American Medical Biography*, in 1828, no book worthy the name of a history on that subject has appeared. In a prefatory chapter Thatcher outlined the history of the profession in this country from the first settlement to the date at which he wrote. The local history of medicine in Philadelphia and in Massachusetts has been carefully studied. The late Dr. Toner, of Washington, laboriously collected all the material which he could obtain bearing on the medical annals of the colonial and revolutionary periods, but the result was all contained within several small pamphlets.

Dr. Park truthfully terms his book an epitome, for it is in reality nothing more. It is, however, a very excellently compiled epitome, and Dr. Park is to be congratulated upon the judicious manner in which he has weeded out the important events in medical history from the mass of rubbish in which they lie embedded. We would heartily recommend all physicians to get this book and read it, and to have it continually at hand for reference. Where the author is compelled by limitations of space to be brief, he has usually contrived to indicate the manner in which the subject can be further pursued by those desirous of acquiring more information.

The book contains a few inaccuracies. Thus, on page 290, he speaks of Dr. Kirkbride as having been Superintendent of the Philadelphia Asylum. As everyone is aware, there is no institution bearing such a title, and Dr. Kirkbride was Superintendent of the Insane Department of the Pennsylvania Hospital. On page 279 he mentions that Benjamin Franklin, when a young man, was a violent opponent of inoculation for smallpox, but does not do Franklin the justice to say that he afterward changed his views completely and wrote a pamphlet in support of the practice, and in his *Autobiography* expresses the regret he felt, when a son of his died of smallpox, that he had not had him inoculated previous to the attack.

The author has followed the classification of the epochs of medical history which was made by Renouard, and which is perhaps as satisfactory as any that could be devised.

The book forms a handsome volume, well printed and tastefully bound. The interspersed illustrations, chiefly from old engravings and old works on medicine, are commendably chosen and handsomely executed.

F. H. P.

THE THROAT AND NOSE AND THEIR DISEASES: Being the fifth, revised, and expanded edition of *The Throat and Its Diseases*, with illustrations by the author, LENNOX BROWNE. London: Balliere, Tindall & Cox, 1898.

WE may say at once that this is Great Britain's best work upon the diseases of the nose and throat. Even when it was first published, some twenty years ago, it was immediately recognized as a most valuable contribution to the literature of this specialty, and since then each successive edition has been so great an improvement upon its predecessor that now we may regard it as *facile princeps* among the many works on rhinology and laryngology that have appeared in Great Britain during the past dozen or fifteen years. For this last edition, the fifth, the author has been fortunate in obtaining the aid of Collier, Cagney, and Wingrave, each of whom has contributed matter of much value. Just previous to his death Cagney re-wrote the chapter on the nervous affections of the larynx, and this is now one of the most interesting and profitable chapters in the book. As a matter of course, the controversy respecting the validity of "Semon's law" is given ample reference, and the subject is brought well up to date. There can be no question that the weight of evidence, both that founded upon clinical observation and that upon experimental research, is very greatly in favor of our acceptance of Semon's conclusions as opposed to those of Grossman. Now that a general and keen interest has been aroused in the matter, closer clinical study, followed by more frequent and more minute postmortem investigation, will probably lead to an early settlement of this somewhat heated discussion. To the consideration of the etiology of nasal and throat diseases has been added a brief but valuable chapter dealing with their bacteriology. This is illustrated sufficiently, and will prove an excellent guide to those who wish to increase in this way their diagnostic resources. In his chapter on diphtheria Browne is far from being enthusiastic in his approval of the antitoxin treatment. Conclusions derived from statistics and the apparently lessened mortality which they give he regards as almost valueless, because the bacteriological test has so greatly altered the former accepted proportion between the number of deaths from diphtheria and the actual number of cases of the disease. The microscope and the culture-tube now class a large number of cases as diphtheria which formerly, upon merely clinical grounds, would have failed of recognition. This question of the value of the antitoxin treatment is another of those which will require a little more time to win over the skeptic and the ultra-conservative. One scarcely cares to criticise small matters of detail in this book, because, taking it as a whole, it is so excellent. It is quite elaborately produced, the illustrations being numerous, and, as a rule, most satisfactory. It is a work that will be best appreciated by specialists, and it is to them, indeed, that its size and price will probably limit its sale. C. P. G.

THE PRINCIPLES OF BACTERIOLOGY. By A. C. ABBOTT, M.D., Professor of Hygiene and Director of the Laboratory of Hygiene, University of Pennsylvania. Fifth edition. Philadelphia and New York: Lea Bros. & Co., 1899.

A MANUAL OF BACTERIOLOGY. By HERBERT W. WILLIAMS, M.D., Professor of Pathology and Bacteriology, Medical Department University of Buffalo. First edition. Philadelphia: P. Blakiston, Son & Co., 1898.

THE PRINCIPLES OF BACTERIOLOGY. BY DR. FERDINAND HUEPPE, Professor of Hygiene in the University of Prague. Authorized translation from the German by DR. E. O. JORDAN, Assistant Professor of Bacteriology in the University of Chicago. The Open Court Publishing Company, Chicago, 1899.

ABBOTT'S *Principles of Bacteriology*, appearing in its fifth edition within seven years, needs no recommendation here.

As a student's manual of instruction, and as a techincal guide that is thoroughly up to date, it is unsurpassed; it is, too, an interesting exposé of a subject the details of which are usually tiresomely monotonous.

Williams's *Manual of Bacteriology*, in its first edition, is scarcely more than half the size of Abbott's, and, as was to be anticipated, is not such a complete or detailed exposition of the subject. Though manual in size, Abbott endeavors to make a critical study of the moot points, while Williams states only the general facts of the case.

It is impossible to find fault with the student who, with five to ten examinations before him, looks for the shortest road to the end of his subject; but this is no reason why teachers should aid him by setting before him naked facts divested of the details that make them interesting and possible of retention.

"The view prevailed in the middle ages that every sin is under the control of and operated by a particular devil; at present each disease, in a similar fashion, has its own devil in the form of a specific bacillus." This sentence, quoted from *The Principles of Bacteriology*, by Dr. Ferdinand Hueppe (translated by Dr. E. O. Jordan), probably gives a better idea of the nature and purpose of the book than a lengthy criticism. He starts out his preface with "Bacteriology is just now in transition from the natural history stage to the scientific," and he acknowledges that he leaves the former aspect of the question to be dealt with in text-books and manuals generally, while he devotes himself entirely to the scientific consideration of the subject. His development of this theme consists in a monograph disproving the specificity of the microbe in the production of disease. He insists "If pathogenic bacteria are the true and sufficient cause of disease, as Pasteur and Koch have affirmed, then at least four conditions would have to be fulfilled. First, the disease-producing bacteria should exert no other effect than that of producing disease; second, their ability to produce disease should remain constant; third, they should affect all animals in the same way without reference to particular species; and, fourth, they should produce only a single, sharply defined, typical and 'specific' infectious disease. All four of these assumed essentials he easily disproves."

As he denies the specific cause of disease to lie in the microbe, he insists also that it is not in the cell, as presented to us by Virchow's pathology, nor yet again in Pettenkofer's predisposition, but in the dynamical energy dormant in the protoplasm of the body and set free by what he terms "liberating impulses," under which he would include microbic agencies. He draws a simile to explain this in a weight held by a string or a support. The weight possesses in itself the potential energy capable of producing a certain effect. It will be the cause of the effect, yet it cannot act until the support is drawn away or the string cut; but the liberating agencies by which the potential is changed into kinetic energy are only adventitious, even though necessary, antecedents, and can never be called the specific causes of the effect.

The exposition of such a question in a few lines scarcely does justice to it, because with the opportunity to illustrate and compare it is by no means so indefinite as this rendering makes it; but, granting that this unnecessarily profound explanation is nearer the exact truth, and that we are using the words predisposing and exciting causes out of their absolute meaning, it is still to a great extent a question of terminology, and it is impossible for him to avoid introducing as the essential initiatives the bacteria, determining at least the direction of the cause, and the predisposition permitting the bacteria to act.

Besides denying the specificity of the microbe, he denies a specific action on the part of any of our so-called specific remedies. Quinine, mercury, antitoxic serum, he endeavors to prove, exert their power by stimulation of the body cells, not by their antiseptic or germicidal action on the microbe or anti effect on the toxin. It is unnecessary, he affirms, to suppose in the body an antitoxin in cases of tolerance to a poison; in habituation to alcohol no anti-alcoholin is found; in habituation to morphine no anti-morphine, and yet a tolerance to these poisons is established apparently by intervention of the body cells.

On the whole, the book is one of a reformer with a reformer's dogmatic overzealousness. Like the majority of reformers, his general idea is in the right direction—namely, toward more serious exactitude in work and greater accuracy of expression. We are using our terms too loosely, and though we claim to be scientific, we are too often satisfied with the merest superficialities instead of prosecuting our investigations to the depth where the true science is to be found.

Hueppe's book has no claim on the student; in the present problematical state of our knowledge his explanations would obscure in place of clearing up; but to a scientific man there is much that would commend itself, and all would interest and profit. The translation of it needs no apology; we have too few books of this character in English medicine.

J. W.

REVIEWS.

Traité de Microbiologie. By E. Duclaux, Director of the Pasteur Institute. Tome II. Diastases, Toxins, and Venins. Paris: Masson et Cie, 1899.

After Cagniard-Latour and Schwann saw the budding of the yeast in beer-wort, and gradually the other fermentations, too, were found to be due to yeasts or moulds or bacteria, it was thought that the mystery of fermentation and putrefaction was solved, and that by simply designating them vital processes, or phenomena which were the result of life, everything was explained. As wonderful as the power of this life seemed to be, there was no thought that we could ever get beyond it. The prodigious activity of these minute organisms was studied, and science stood in amazement while contemplating the facts. A man consumes daily a quantity of food equal to about one-fiftieth of his weight, and for purposes of assimilation is unable to decompose more; the yeast of beer can break up daily from four to five times its weight of sugar, and is by no means the most powerful yeast.

Man was thought to be fastidious in his articles of diet on account of generations of training and refinement, but his epicurism was scarcely to be mentioned in comparison with that of these lowest plants.

Raulin composed for the aspergillus an artificial fluid, on which it was found the organism grew most luxuriantly and with least deviations in weight when full grown; he then withdrew different ones of the constituents of this perfect medium and studied the effect.

The medium was composed of water, sugar-candy, tartaric acid, nitrate and phosphate and sulphate of ammonia, carbonate of potassium and of magnesium, sulphate of zinc and of iron, and silicate of potassium. He found if he omitted the potassium entirely the growth of the plant was twenty-five times less, and if ammonia was withdrawn one hundred and fifty times less. But these constituents were present in the fluid in appreciable quantities; that which was remarkable was the discovery that if the zinc which was present in a dilution of one to fifty thousand was removed the growth was ten times less than in the original liquid—or, in other words, one milligramme of zinc was able to make a difference of seven hundred times that weight in the growth of the aspergillus.

It was these experiments that led Duclaux to observe, in 1884: "If we reflect that in a liquid containing only one fifty-thousandth part of zinc one or two generations of aspergillus might, by completely absorbing the metal, weaken or frustrate the existence of a new generation—that in such a liquid a fresh process of sowing (I was going to say inoculation) would be destined to fail—how is it possible not to reflect at the same time on the mysterious nature of virulent diseases, such as smallpox, scarlatina, typhoid fever, which never appear twice in the same person?"

PROGRESS

OF

MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

WILLIAM OSLER, M.D.,
PROFESSOR OF MEDICINE IN THE JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND,

AND

GEORGE DOCK, M.D.,
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Asthenic Paralysis, Albumosuria, and Multiple Myeloma.—SENATOR (*Berliner klin. Wochenschrift*, 1899, No. 8) describes the following rare and interesting case: The patient, a merchant's widow, came to the hospital in February, 1897, with symptoms thought to be those of nephritis, albumin, casts, and epithelial cells being found in the urine. She returned early in March in a worse condition, complaining of pain in the head, back, and legs, and of weakness. Large quantities of albumose were at this time first demonstrated in the urine. She was weak and anæmic, walked with a creeping motion, and complained of a difficulty in swallowing, which so interfered with her nourishment that she became so weak as to be unable to walk. There was no swelling of the glands and no fever. Examinations of the organs of the chest and abdomen were negative. The signs on the part of the nervous system were very striking. There was paralysis of the tongue, which gradually became complete. The patient could neither move the tongue in the mouth nor protrude it, in consequence of which swallowing was difficult, and it was necessary to take nourishment through a tube. The chin felt as if it were dead. There was an anæsthetic zone in which all sensations were absent, extending from the under lip to the chin, 2½ cm. broad. The vocal cords moved fairly well, but there remained a slit in the rima glottidis as a result of paresis of the arytenoid muscles. The other cranial nerves showed no disturbances. The pupillary reflex was good, the fundus of the eye showed no abnormality except pallor. The pharyngeal musculature showed no disturbance. The legs were not atrophied nor paralyzed, but there was great weakness and sensitiveness of the left peroneal and tibial nerves. The patellar reflexes were increased. The blood-corpuscles were pale, but otherwise not remarkable. The tongue showed no distinct atrophy, but in the middle there was often fibrillary twitching. Electric tests revealed